


2012

# Memory Priming in Elderly Individuals Diagnosed with Dementia

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# Memory Priming in Elderly Individuals Diagnosed with Dementia

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree
Master of Arts
In
Clinical Psychology

Minnesota State University, Mankato
Mankato, Minnesota

May 2012

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This thesis paper has been examined and approved by the following members of the thesis committee.

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# Abstract

The purpose of the current study was to examine the efficacy of a novel memory enhancement procedure for individuals with dementia named “memory priming.” Three elderly individuals with a diagnosis of dementia participated in the study. Baseline procedures involved identifying low-probability items that served as targets for the intervention and moderate-probability questions that served as control items. A variation of a reversal design was implemented to compare three different conditions: the memory priming intervention and two control conditions that involved reading aloud and a watching a video. The results of the study indicated that individuals with moderate-to-severe memory impairment do have the ability to increase their recall of personally-relevant information, and that an activity requiring cognitive effort (i.e., reading aloud and engaging in a preferred conversation) may produce the most benefit compared to a more passive and less cognitively stimulating activity (i.e., watching a video).

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# Chapter I

## Introduction

The occurrence of Alzheimer's disease (AD) and other dementias are being significantly impacted by the changing age structure of the United States population (Herbert, Scherr, Bienias, Bennett, & Evans, 2003). This is in part the result of a combination of healthcare improvements and people living healthier lives over the last century (Alzheimer's Disease International, 2009). Dementia is predominantly diagnosed in later life and given the advancing age of the population, the prevalence has risen dramatically (Midence & Cunliffe, 1996). Across the world it is estimated that approximately 35.6 million people have a diagnosis of dementia and that by the year 2050 the number could be as high as 115.4 million (Alzheimer's Disease International, 2009). Specifically, it is estimated that 70% of nursing home residents have some form of cognitive impairment, in addition to the 47% of residents that have a specific diagnosis of a condition that causes progressive dementia such as AD (Hawley & Cherry, 2008). Given the high prevalence of dementias, the duration of these conditions, and the impairment caused in social and occupational functioning, their cost is quite substantial (Brookmeyer, et al., 2011). Despite the impact of the disorder however, those with AD are not completely amnesic (Cummings & Benson, 1992) which makes the continued exploration and research of cognitive rehabilitation techniques increasingly important.

### Description of Dementia and Alzheimer's Disease

Dementia is characterized by a vast array of cognitive impairments including a loss of or decline in memory, a diminished ability to speak coherently or understand written language, as well as declines in executing motor activities, behavioral problems, and executive functioning

(4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000). In addition to memory impairment, at least one other cognitive domain must be impacted. This may include; aphasia (e.g., language disturbance), apraxia (e.g., inability to carry out motor activities despite intact motor functioning), agnosia (e.g., difficulty recognizing items). Noncognitive disturbances such as the inability to carry out basic activities of daily living may also be impacted (Onor et al., 2007). The activities of daily living that can be impacted include washing, dressing, or using the telephone, all of which can be impacted (Onor et al., 2007). AD is the most common type of dementia, and accounts for approximately 60–80% of dementia cases (Alzheimer's Association, 2011).

AD is a progressive disease that has a mean survival time of 4-8 years following a diagnosis, although in rare cases the disease can progress for up to 20 years (Alzheimer's Association, 2011). Cognitive deficits in the early stages of the disease are characterized by short-term memory difficulties, word-finding problems, and repetition of statements or questions. These early cognitive deficits can lead to significant functional impairment (Sitzer, Twamley, & Jeste, 2006; Midence & Cunliffe, 1996). Unfortunately, symptoms including forgetting names of loved ones and words may go undetected for as many as three years before a physician indicates impairment in cognition or dementia (Sandman, 1993). One of the earliest and most problematic symptoms of AD is memory impairment (Schmitter-Edgecomb, Howard, Pavawalla, Howell, & Rueda, 2008). Memory impairment can include deficits in both short-term memory and new learning. Memory deficits can result in frustration, withdrawal, depression, and dependence, all of which may be associated with cognitive impairments (Sherman, 1999). Furthermore, these memory deficits can lead to difficulty in name-face recognition, a diminished capacity to convey information, and an inability to recall daily events

(Moore, Sandman, McGrady, & Kesslak, 2001). As the disease progresses, cognitive impairment worsens and appears to increase tension between patients and their surroundings (Nawate, Kaneko, Hanaoka, & Okamura, 2008).

According to Goldsilver and Gruneir (2001) once an individual has been diagnosed with dementia, disability as opposed to capability becomes the focus. Therefore, family members are often left with unanswered questions about how to help their loved ones with memory difficulties (Moniz-Cook, 2006). However, treatment options are available and memory enhancement can be possible for those individuals diagnosed with mild-to-moderate dementia (Eckroth-Bucher & Siberski, 2009). This highlights the importance of continual development and testing of interventions that may combat the progressive nature of the disorder.

**Pharmacological Treatments for Alzheimer's Disease**

Currently there is no cure for AD, nor are empirically-supported methods for prevention available. There are, however, several medications that may help slow the progression of the disease and its symptoms including, deficits in language, memory and thinking. The United States Food and Drug Administration have approved two classes of medications for the treatment of AD. One class of drugs is the cholinesterase inhibitors (e.g., Donepezil). The mechanism by which these drugs operate is to prevent the enzyme cholinesterase from breaking down the neurotransmitter acetylcholine which plays a vital role in learning and memory (Hogan, et al., 2008). While many people do not experience side effects from these drugs, some of the most common side effects are gastrointestinal in nature such as nausea, diarrhea, and loss of appetite (Bassil & Grossberg, 2009; Hogan et al., 2008). Although a meta-analysis of randomized control trials of cholinesterase inhibitors has demonstrated consistent benefits, the clinical significance is

debatable (Hogan et al., 2008) meaning that cognitive benefits may be minimal compared to the cost of the side effects.

A second pharmalogical intervention for those with AD is Galantamine (i.e., memantine), but this drug is not recommended for individuals with mild-dementia (Hogan et al., 2008). Galantamine is different from the cholinesterase inhibitors in that it is a glutamate inhibitor. Given the complexity of the disorder, drugs used to treat AD only slow down the progression of cognitive decline (Onor et al., 2007), thus leaving room for non-pharmalogical intervention such as memory enhancing procedures aimed at improving memory and preventing cognitive decline (Buchanan, Christenson, Houlihan, & Ostrom, 2011). Furthermore, it is often caregivers who have the responsibility of medication administration and management, which can become problematic when these individuals have time commitments such as employment (Bassil & Grossberg, 2009).

**Memory Enhancement Procedures**

For individuals with AD, pharmacological therapy was once believed to be the only possible or effective intervention. Recently however, the term "mental exercise" has become increasingly common in the popular press and scholarly literature. Mental exercise is viewed as a possible alternative or supplement to medications for improving cognitive functioning in healthy older adults and, less commonly, persons with dementia. Unfortunately, "mental exercise" is often a confusing and unclear term (Moniz-Cook, 2006) that can range from memory training (Zarit, Zarit, & Reever, 1982), memory rehabilitation (Clare, 1999), cognitive rehabilitation (Clare & Woods, 2001), and memory stimulation (Grandmaison & Simard, 2003). The goal of memory enhancement procedures is to improve memory deficits, while cognitive interventions focus on all domains related to cognition, including aphasia. Another distinction between these

terms that can be made is that cognitive stimulation interventions focus on the idea that cognitive and social functioning can be improved through engagement in mental activities. Alternatively, cognitive training uses specific guided tasks and practice aimed at enhancing a specific cognitive domain such as memory or language (Clare & Woods, 2004). Lastly, the term rehabilitation involves assisting individuals with cognitive impairments and their family members; however, performance improvement on cognitive tasks is not the goal and the aim is at improving everyday functioning (Wilson, 1997). Despite the lack of clarity in "mental exercise" terminology, examination of non-pharmaceutical interventions is essential given the limited effectiveness of pharmaceutical interventions (Gräsel, Wiltfang, & Kornhuber, 2003).

The term "cognitive rehabilitation" may be the most useful of the terms equated with mental exercise because it offers an overarching goal for cognitive interventions. Cognitive rehabilitation techniques focus on optimizing functioning, minimizing disability risk, and reducing strained familial environments (Clare & Woods, 2001). Research over the past 25 years indicates the potential benefits of cognitive rehabilitation interventions for those with AD (Clare et al., 2002; Buchanan et al., 2011). The following sections discuss studies that have explored the range of cognitive rehabilitation techniques.

**External memory aids.** One set of memory enhancement techniques often used are external memory aids. External memory aids include memory books, memory wallets, diaries, calendars, or cueing cards. Bourgeois (1990) first used memory wallets and books for those with dementia to evoke positive change in conversations. Individuals that used a memory book in their conversations gave more factual information and demonstrated less repetitive comments compared to conversations that did not include a memory aid. The results suggested that the

stimuli in the book became a cue that triggered recognition of the personally-relevant information and retrieval from memory storage.

Bourgeois and colleagues (1997) expanded the research on the use of external memory aids beyond just using them during conversations by examining problem behavior related to memory impairment. In their study, researchers trained caregivers to direct dementia patients to read a memory book page when they began to repeat verbalizations. Results indicated a reduced frequency in repeated verbalizations, and caregivers reported satisfaction with their ability to redirect the individual. Nolan, Mathews, and Harrison (2001) investigated the impact of external memory aids on room finding in older adults with dementia. Findings from the study showed an increase in room finding by over 50% when a combination of a photograph of the individual and a sign with their name were used.

External memory aids offer a very useful set of strategies for offsetting memory loss in persons with dementia; however, there are some limitations. A major common problem with the use of memory aids is that often individuals forget that the memory aids have even been made, may lose it, or may not use it when appropriate; thus, reducing the likelihood of their efficacy and clinical utility. Without the assistance of a caregiver to prompt the individual, memory aids may be viewed as a waste of time by clinicians and caregivers (Bourgeois, et al., 2003). Ultimately, more research is needed to discover ways to teach the individuals to independently use compensatory strategies, such as an external memory aid (Buchanan, et al., 2011; Bourgeois, et al., 2003).

**Errorless learning.** Another type of cognitive rehabilitation strategy, errorless (EL) learning focuses on helping individuals learn new information or re-learn forgotten information, which presumably increases independent functioning. EL procedures are one set of strategies

that have been used successfully for improving memory in persons with dementia. Use of this technique emerged from the field of behavioral psychology research in the 1960s. The mechanism behind EL involves having an individual learn or encode new information without error. Individuals are not encouraged to guess an answer, as in errorful (EF) learning, but are given the correct answer within a learning session. If an individual is unsure of an answer, they just respond with an," I don't know," thus keeping errors at a minimum and increasing feedback in the form of the correct answer (Tailby & Haslam, 2003; Buchanan, et al., 2011).

Baddeley and Wilson (1994) first applied this technique with amnesic individuals. Participants with amnesia and control participants learned a list of words under the EL condition better than under the EF condition. More recently, research has moved forward to include interventions for individuals with early stage AD. Clare and colleagues (1999) conducted a study that examined whether individuals with AD could learn face-name associations with EL. Through the use of Polaroid pictures, training, and EL principles, the participant of the study was able to learn face-name associations and this information was retained at a follow-up nine months later. However, further research regarding the use of EL needs to continue. Dunn and Clare (2007) compared EL and EF procedures, and results indicated no statistical significance in efficacy across the techniques. Earlier views regarding error reduction may be less important and the mechanisms underlying learning need to be re-examined

**Spaced retrieval.** Spaced retrieval (SR) is a technique used for learning and recalling information by adjusting between-trial delays based on a learner's performance (Camp, 1989; Camp, Foss, O'Hanlon, & Stevens, 1996). For instance, information is taught to an individual and then repeatedly tested at different intervals based on whether or not recall was successful. If the target information is answered correctly, the interval of time in which the next question is

asked is systematically increased. However, if the target question is answered unsuccessfully the information is restated and the time interval between the next question is reduced to that of a prior successful trial. Because time intervals between trials are gradually increased, errors tend to be minimized, making SR a type of errorless learning procedure.

Landauer & Bjork (1978) first used this memory intervention technique with the goal of enhancing face-name associations to multiple targets. Camp (1989) made revisions to the SR technique to apply it to individuals with AD. Changes included focusing on a single target stimulus and by manipulating intervals between targets with time and conversation as opposed to number of other pictures presented.

Hayden and Camp (1995) examined the efficacy of SR in individuals with dementia associated with Parkinson's disease. The two participants were men, aged 63 and 79, and diagnosed as having Parkinson's disease. The study aimed at using SR to improve motor-learning of a simple task. Results of the study concluded SR could potentially be an intervention for an array of memory impairments, including those linked to Parkinson's disease.

Anderson and colleagues (2001) compared the effectiveness of SR to memory tape therapy in individuals with AD. Participants of the study were six participants, three in each condition. Personal orientation information (i.e., current year and name of facility) as well as familial information (i.e., names of children) were assessed during baseline. Items targeted during the intervention were those that the participant consistently answered incorrectly during the previous baseline phase. Results showed improvements for participants in both conditions, but those in the SR group had a tendency to learn the target information more rapidly.

Hawley and Cherry (2004) conducted a study to enhance name-face associations in individuals with probable AD. An additional goal of the study was aimed at determining if

learning could be transferred from a picture to an actual person. The study included six individuals with probable AD and diagnosis of mild-to-moderate dementia. Results of the study indicated efficacy in recalling name–face associations in individuals with probable AD. Furthermore, the study highlighted the potential transference of name-face associations to actual target individuals.

SR is a technique with numerous advantages including, having training sessions within a social context, a schedule similar to shaping is used resulting in higher success rates, and the learning requires little effort (Camp & Stevens, 1990). The technique has shown efficacy in working with many populations and for an array of target behaviors such as name-face associations, motor-learning tasks, and increasing recall of personally-relevant information (Anderson, Arens, Johnson, & Coppens, 2001; Brush & Camp, 1998; Hawley & Cherry, 2004; Hayden & Camp, 1995).

**Purpose of the Study**

It is clear that a growing body of evidence suggests that structured cognitive rehabilitation interventions can produce benefits in persons with mild-dementia. However, further research is needed in order to develop additional interventions that are practical for caregivers to implement in real-world situations (Brush & Camp, 1998; Camp, et al., 1996; Hawley & Cherry, 2004). The current study investigates the efficacy of a novel memory enhancement procedure for individuals with dementia called “memory priming.” “Priming” refers to the use of a cue or stimulus to improve memory recall and can be compared to a “warm-up” similar to stretching prior to running or heating up a pan before cooking (Fiksdal, Houlihan, & Buchanan, manuscript under review). This concept was based on anecdotal observations made by the second and third author of the earlier thesis during the course of their careers in

working with individuals with dementia. Many individuals with memory impairment often repeat a limited number of stories in great detail, including, stories about their family, where they grew up, or their unique interests. The rationale is that once participants begin taking about certain preferred topics for a specific period of time(i.e., a "warm-up") they will increase their ability to learn new information or relearn material. Thus, it is the goal of MP to use an individual's existing strengths (i.e., the ability to converse and recall topics of interest) to improve a specific cognitive deficit, memory impairment.

In a previous study (Fiksdal, Houlihan, & Buchanan, manuscript under review) results indicated that the "memory priming" was effective in teaching three out of four target questions to a 95-year-old male with moderate-dementia; however, this study lacked a comparable condition that did not include the MP intervention and feedback was not given to the participant. Furthermore, the previous study included a SR component. It was the goal of the current study to separate the "priming" from other possible treatment components to ensure that the priming component was responsible for change. To strengthen the argument that the MP intervention is responsible for improved memory recall the current study sought to compare the effectiveness of the MP intervention to two control conditions: a Reading Aloud condition, which involved cognitive effort, but was not conversational in nature and a Video condition which represented a passive activity that did not require cognitive effort. Given the effectiveness of the procedure in an earlier study, it was hypothesized that the ability to recall personally-relevant information would be highest in the Memory Priming condition (e.g. the preferred story intervention).

# Method

## Participants

Participants were recruited from two senior care living facilities within the Midwest. The residents were referred for participation by facility directors and consent was provided by family members. A copy of the consent form can be seen in Appendix A. Those recruited were diagnosed with dementia, including dementia of the Alzheimer's type and subcortical dementia. Additional inclusion criteria were: 1) staff reported that the individuals had difficulties with remembering names of people, and information deemed important by family members (i.e., "What is the name of the town you live in?"), 2) according to staff, the resident had good verbal skills in the sense that they could maintain and follow a simple conversation, and 3) staff reported that the resident generally enjoyed social interaction and did not display significant behavioral problems. Exclusion criteria included severe visual, verbal, and communication impairment.

Eight potential participants were recruited and consent forms were completed by their family members; however, family members of two potential participants later declined family member participation because the potential participants were experiencing increased physical decline. In addition, two participants were excluded from the study. After meeting with a potential male participant, it was determined that this individual would not be suitable for the study because during an initial meeting this individual was unable to maintain a conversation with the researchers. Following additional assessment of the second participant, she was excluded due to not having a diagnosis of dementia. A fourth participant discontinued participation from the study following baseline. During the baseline phase, the researchers noticed increased cognitive decline, agitation, and a general lack of ability to maintain a coherent

conversation. Residential staff at the facility confirmed the participant's overall decline, and her family was immediately notified. Furthermore, the researchers were unable to identify potential target and moderate probability questions as the participant either answered the questions correctly 100% of the time, or never answered correct. A total of three individuals completed the study.

Each participant was administered the Modified-Mini-Mental Status Exam (3MS; Teng & Chui, 1987) to obtain a global assessment of their level of cognitive impairment. The 3MS is a modified version of the Mini-Mental Status Exam (MMSE) (Folstein, Folstein, & McHugh, 1975). The 3MS targets object naming, concentration, immediate and delayed recall orientation, registration, language, executive functioning, and ability to follow commands. Scores on the 3MS range from 0–100 and normative data for different age groups and levels of education were used to interpret the scores of the participants in this study. Because the 3MS is an expanded version of the commonly used Mini-Mental Status Examination (MMSE), an MMSE score can also be derived from the 3MS.

The first participant, Blanche, was a 76-year-old Caucasian female who had a primary diagnosis of AD. Blanche had difficulty with verbal communication and often repeated stories and questions to the researcher. Additionally, she had a difficult time remembering the names of family members, even with the aid of pictures. Blanche reported enjoying the company of the researchers; however, from session to session, the participant was unable to remember the researchers. Blanche had a score of 34 on the 3MS, which is below the 2$^{nd}$ percentile for individuals of her age and education level. It was estimated that her MMSE score would be between 9 and 11, indicating moderate-to-severe cognitive impairment.

The second participant, Maggie, was an 84-year-old Caucasian female with a formal diagnosis of dementia. Maggie displayed aphasia as indicated by her impairment with verbal

expression. She would often repeat questions and be very tangential during the course of a conversation. Despite being tangential at times, Maggie was able to maintain conversation with the researchers; thus it was determined that she was appropriate for the study. The formal assessment of the 3MS resulted in a score of 32, and placed her below the 2nd percentile for her age and education level. It was estimated that her MMSE score would be between 8 and10, indicating severe cognitive impairment.

The third participant, Nancy, was an 86-year-old Caucasian female with subcortical dementia. Nancy displayed aphasia during early meetings as she often referred to objects as "things," "thingamajigs," or "that." Although she would not repeat stories within a meeting, she could not remember the researchers on a day-to-day basis. Furthermore, she often had difficulty remembering the names of her brothers and her sons as she would get the two groups of men mixed up. Nancy had a score of 43 on the 3MS which fell below the 2nd percentile for her age and education level. Her MMSE score was 12, indicating moderate cognitive impairment.

## Procedures

**Assessment**. Once participants were recruited, the principle investigator and the primary data collector met with the resident to determine appropriateness for the study. The participant's ability to maintain a conversation, as well as overall level of cognitive impairment was assessed. After the initial meeting, and informal assessment, the 3MS was administered to determine the level of cognitive functioning. Lastly, family members were interviewed in person or via phone to gather information about stories that the participant enjoys discussing. The primary researcher attempted to verify the preferred nature of these stories by asking the participant, "Do you enjoy

talking about your family vacation?" Based on participant response, it was determined that all topics were truly preferred conversations.

Family members were also asked to provide a list of possible questions to ask the participant during the intervention phase. The questions that were generated were related to family members (i.e. names), questions related to the participant's past (e.g., childhood/adolescent memories, favorite vacations), and questions deemed important by the family members (i.e. current location). See Table 1 for the list of moderate-probability and low-probability target questions for each participant. The family of participant one also provided the researcher with current pictures to use during baseline and intervention; however, pictures were not available for use with the other two participants.

**Baseline**. During the baseline procedure, the goal was to ask the participant the questions generated during the assessment phase in order to identify "low-probability" questions and "moderate-probability" questions. The low-probability questions were questions that the participant answered correctly less than 30 % of the time, participant 1 (*M*=20%), participant two (*M*=26.1%), and participant three (*M*=18.87%).These questions served as the target questions during the intervention phase, with one target question being designated to each of the three separate intervention conditions. Target questions were randomly assigned to each condition. Moderate-probability questions were those that the resident responded to correctly between 30% and 70% of the time or higher, participant one (*M*=66.6%), participant two (*M*=52.66%), and participant three (*M*=50.57%). Baseline lasted four to six sessions, and each question was asked four to six times. Session duration ranged from 6 minutes 20 seconds–19 minutes 5 seconds (*M*=12 minutes 2 seconds). The ultimate goal of the baseline phase was to identify three low-probability target questions and five moderate-probability control questions. The purpose of the

moderate-probability questions was to serve as a control across conditions. These questions were not the target of intervention; thus it was expected that accuracy rates for these items would remain stable across sessions and across conditions. Table 1 lists the low- and moderate-probability questions asked for each participant. During each baseline session; two researchers conversed with the participant while periodically interrupting to ask the participant a question. The main researcher asked the questions and recorded the order in which they were asked while the assistant recorded whether or not the question was answered correctly. During this phase, feedback and social praise was provided to ensure that the questions truly were low-probability questions. If an individual answered correctly, they would receive praise such as, "Yes! Correct, that is Suzie!!" Incorrect answers, and those not answered were followed with feedback in the form of the correct answer, "This is a picture of your youngest daughter, Marie." Those questions answered incorrectly, or not responded to were asked again later that session to see if the feedback was effective. This provision of feedback during baseline allowed the researchers to determine the impact of feedback alone on recall. Feedback during baseline also ensured that these truly were low-probability questions, and that they were in the repertoire of the participant. Once three low-probability questions and five moderate-probability questions were identified, the baseline procedure was complete and the treatment evaluation phase began.

**Intervention**

Following identification of the three low-probability target and five moderate-probability questions during the baseline phase, one of three intervention conditions was implemented. A variation of a reversal design was implemented to evaluate the effectiveness of the interventions. The order in which conditions were presented was counterbalanced across participants to eliminate order effects. Each session focused on one low-probability question; however, all of

the moderate-probability questions were utilized during the entire intervention phase. To assess for retention of learned questions from the previous condition, all sessions (excluding those of the first condition), began with a probe. The probe consisted of asking the participant the question that was learned during the previous condition. The participant was given feedback as to whether or not they answered the probe question correctly.

**Preferred Conversation Condition**. To begin the Preferred Conversation condition, the participant was randomly asked about one of their preferred topics identified during previous interviews of family members, staff, and the participant. The researchers then engaged in this conversation with the individual for five minutes prior to asking the first question. Following the initial five minute conversation, a low-probability question was asked, followed by a moderate-probability question two minutes later. This process was then repeated with the same low-probability question, and a different moderate-probability question. During each session, low-probability questions were asked between three and five times (every 4 minutes) and three to five of the moderate-probability questions were asked once (every 4 minutes). Regardless of type of question, a question was asked approximately once every two minutes. The primary researcher used an I-phone as a timing device to ensure that two minutes passed between each subsequent question asked. The assistant researcher utilized an I-pod to record at what time questions were asked. During this phase, if the resident answered correctly they received social praise (e.g., "Yes, that's correct, good job"); however, if the participant answered incorrectly or did not respond, feedback was provided (e.g., "This is a picture of your youngest grandson, Ralph"). Sessions were complete when either all of the questions were answered, or when the participant was feeling fatigued and wanted to end the session for the day. Sessions lasted between 9 and 22

minutes for the first participant, 21 and 26 minutes for the second participant and 21 and 25 minutes for the third participant.

**Video Condition.** The Video condition consisted of the resident watching a five-minute film clip (from the movie *Planet Earth*) prior to asking low-and moderate-probability questions (Attenborough & Parker, 2008) The same five-minute clip was played for each session of the video phase, and was the same across participants. The clip from the movie was selected due to the neutral nature of the clip, meaning that the clip was not meant to evoke strong emotional responses. A neutral video clip was used because it provided a passive activity that was not intended to be intellectually stimulating or emotionally evocative. The Video condition was included to compare results from the cognitively engaging activity (i.e., reading aloud) and the emotionally evocative and cognitively stimulating activity (i.e., the preferred conversation). Following the five-minute video clip, questions were asked using the same procedure described above for the Preferred Conversation condition. A separate target question was the focus of the Video condition; however, the five moderate-probability questions remained the same.

**Reading Aloud Condition.** For the Reading Aloud condition, the participants were asked to read a passage from the book, *Island of the Blue Dolphins* (O'Dell, 1960) for five minutes prior to answering questions. Each participant began on page one of the book, and read aloud to the researchers. The number of pages read for each participant ranged from one to four pages. Once five minutes of reading had elapsed, the participant was asked questions using the same procedure described above for the Preferred Conversation and Video conditions. Again, all moderate-probability questions remained consistent across conditions, but the low-probability target question was different.

**Follow-Up.** After the last session, the three target questions and five moderate-probability questions were probed to assess for maintenance of treatment gains. The participants were first asked the low-probability target questions followed by two moderate-probability questions randomly placed in between. All eight questions were asked once during both the 2-week and 4-week follow-up. The questions were asked using the same procedure from the baseline phase, in that two minute gaps between questions were not present. Participants were given feedback during each of the follow-up sessions.

# Chapter III

## Results

Three low-probability target questions were targeted for each participant, one for each of the three treatment conditions. Table 2 illustrates the percentage of correct responses for each target question across baseline and all intervention phases for each of the three participants. Data for each participant will be discussed in the sections below.

### Blanche

A summary of Blanche's data throughout the course of the study can be seen in Figure 1 as well as Table 2. In the baseline phase, Blanche correctly identified each low-probability target question 20% of the time, and moderate-probability questions an average of 66% percent of the time across all five questions. A list of all questions can be found in Table 1.

Following baseline, each condition was implemented with a different target question. It is important to note that the number of times the each target question was asked during each individual session varied across conditions due to the participant's mood and level of engagement on a particular day, or because of factors such as time of day. During the Preferred Conversation condition, the target question was asked an average of 3.33 times (range 2-5). During the Reading Aloud condition, the target question was asked an average of 3.66 times (range 3-5). During the Video condition, the target question was asked an average of 2.33 times (range 2-3).

Upon implementation of the Preferred Conversation condition, correct responding for target question one increased from 20% during baseline to 66.6% during the third day of the intervention, with a mean accuracy rate of 30% across the entire phase. The next phase involved

implementing the Reading Aloud condition. As can be seen from Figure 1, accuracy for target question two eventually reached 100% by the third day of intervention and the mean accuracy during this phase was 50%. A reversal back to the Preferred Conversation intervention yielded similar results to those of the first implementation, with the participant correctly identifying the target an average of 33.3% of the time. The Video condition resulted in 0% recall for target question three during all sessions. In the final phase of the study, the Reading Aloud condition again produced positive results, with a mean accuracy of 66% across all three intervention days.

Results of the follow-ups indicate that target two, asked during the Reading Aloud phase was most successfully recalled, as it was identified correctly during the 2-and 4-week follow-up. Target question one was successfully answered during the 2-week follow-up, but not during the 4-week follow-up. Target question three was never correctly answered during the 2-and 4-week follow-up.

Figure 2 illustrates the accuracy for the moderate-probability questions. Initially, each moderate-probability question was answered correctly an average of 66% of the time with a range from 40-80%. During the course of intervention, the average percent correct that the participant correctly identified the moderate-probability question during each phase declined. The range of percent correct spanned from 11% (in the Preferred Conversation Reversal condition and the Video condition) to 64% during the first presentation of the Preferred Conversation condition. By the 4-week follow-up, she was only able to identify 40% of the moderate-probability questions, a decline of 26% from the start of baseline procedures.

Table 3 displays the percentage of correct responding for the probe questions asked at the start of each session. The probe question during a condition was the question targeted during the

preceding condition. For example, in the Reading Aloud condition the probe question was target question one from the Preferred Conversation condition. Target question one was probed on two separate occasions and before two different conditions. Maintenance of gains can be seen for target question one at 33.3% during the first probe assessment; however, by the second probe assessment, the participant was unable to correctly identify the probe. Target question two was probed during the Preferred Conversation condition, and was correctly identified on the first day of this phase. For all subsequent days, the participant was unable to answer this probe correctly. The third target question was probed during the Reading Aloud Reversal condition and was unable to be correctly recalled during any session.

**Maggie**

A summary of Maggie's data can be seen in Figure 3 as well as Table 2. During the baseline phase, Maggie correctly identified target question one 33.3% of the time, target question two 25% of the time, and target question three 20% of the time, for an average of 26% accuracy across all three target items. It should be noted that target question one was correctly answered 33.3% of the time, which exceeds the criterion to be considered a low-probability item. This question was used as a target, however, because another target item meeting low-probability criteria could not be identified and accuracy for this item was only slightly above the necessary criterion. Moderate-probability questions were correctly identified an average of 53% of the time during baseline. Table 1 illustrates a list of target and moderate-probability questions asked during the course of intervention.

After baseline procedures, implementation of the interventions began and a separate low-probability target question was asked during each phase. The number of times that each target was asked during each individual session varied little with an overall range of 4-6 presentations.

During the Preferred Conversation condition, the target question was asked an average of 4.5 times (range 4-5). During the Reading Aloud condition, the target question was asked an average of 5 times (range 4-6). During the Video condition the target question was asked 5 times during each day of this condition.

Participant 2 began with the Reading Aloud condition. In the initial phase of treatment, correct responding for target question one increased from 33.3% during baseline, to 60% by the third day of intervention (with a mean for this phase of the study of 46.6%). The next phase involved the Video condition. As can be seen from Figure 2, target question two was correctly identified just 7% of the time on average. During the reversal back to the Reading Aloud condition, Maggie was able to correctly identify target question one 40% of the time across each of the four days of this intervention. This intervention was implemented for four days due to a fall that had occurred with Maggie on day three. The fourth phase involved the Preferred Conversation condition. Correct responding during this condition progressively declined over time and by the fourth day the target was identified correctly 0% of the time (mean accuracy during this phase was 16.7%). This procedure was implemented four days due to an increase of participant fatigue as noticed by the researcher. Specifically, on the third day of the intervention Maggie was evidently more tired and drifting in and out of sleep during the course of the session, so a fourth session was deemed necessary. In the final phase of the study, a reversal to the Video condition, it was demonstrated that the participant could correctly identify the target question only 20% of the time on the first day, but on subsequent days of this condition she was unable to correctly identify the target question on any occasion (mean accuracy during this phase was 7%).

Results of the follow-up conditions indicate that none of the low-probability target questions could be correctly identified during the 2-and 4-week follow-up. Furthermore, during

the 4-week follow-up, the participant was increasingly fatigued, and the research assistant could only ask target questions one and three.

Figure 4 illustrates the progression of the percent correct of the moderate-probability questions. During the baseline phase the moderate-probability questions were correctly answered an average of 53% of the time and had a range of 33.3-60%. During the course of intervention, the average percent correct that the participant correctly identified the moderate-probability questions remained relatively stable with an average of 57.8% across all phases, not including follow-up. The range of percent correct spanned from 50% in the Reading Aloud Reversal condition to 69% in the initial Reading Aloud condition. At the 2-week follow-up, Maggie was able to correctly identify 80% of the moderate-probability questions. This percent correct was not maintained by the 4-week follow-up, and she was only able to correctly identify 33.3% of the moderate-probability questions. Additionally, during the 4-week follow-up, only three of the moderate-probability questions were asked.

Table 4 displays the percentage of correct responding for the probe questions asked at the start of each session. Target question one was probed on two separate occasions and prior to the initiation of two different conditions. The participant was unable to correctly identify target question one when it was first probed prior to the Video condition, but maintenance of gains can be seen for target question one at 25% during the second probe assessment. Target question two was probed during the Reading Aloud condition, and was unable to be correctly identified on any occasion. Target question three was probed during the Video Reversal condition, and was correctly identified 33.3% of the time.

**Nancy**

A summary of Nancy's data can be found in Figure 5 as well as in Table 2. In the baseline phase, Nancy correctly identified target question one 16.66% of the time, target question two 20% of the time, and target question three 20% of the time, for an average of 18.89% across all three target questions. Moderate-probability questions were answered correctly an average of 50.57% of the time with a range from 40–60%.

Following identification of low-probability target and moderate-probability questions, the intervention for Nancy began with the Video condition. During this phase, the participant was able to correctly identify target question two an average of 86.6% of the time across all three days. As the treatment progressed to the next phase, Nancy correctly identified target question one 100% of the time during each session of the Preferred Conversation condition. A reversal back to the Video condition demonstrated results comparable to the first implementation of the procedure in that correct responding was observed 100% of the time during each of the three days. The Reading Aloud condition was implemented following the reversal to the Video condition. Target question three was answered correctly 20% of the time during this condition, which represents no change compared to baseline accuracy for this target item. A reversal back to the Preferred Conversation condition resulted in correct responding 73.3% of the time. Although this is somewhat lower than the first implementation of this intervention (*M*=100%), it does represent a high rate of correct responding compared to baseline (*M*=17%). Eight days had passed since the last time this target item was probed, and 13 days had elapsed prior to the last day this question had been targeted.

Results of the follow-ups indicate that target one, asked during the Preferred Conversation condition, and target question two, asked during the Video condition were most successfully recalled. Both target questions were identified correctly during the 2-and 4-week

follow-up sessions. Target question three, asked during the Reading Aloud condition was never successfully recalled during the 2-or 4-week follow-up.

Figure 6 illustrates the progression of the percent correct of the moderate-probability questions. During the baseline phase the moderate-probability questions were correctly answered an average of 51% of the time and had a range of 40-60%. During the course of intervention, the average percent correct that the participant correctly identified the moderate-probability question progressively increased to an average of 76% across all phases, not including follow-up. The range of percent correct spanned from 68% in the Reading Aloud condition to 86% in the Video Reversal condition. At the 2-week follow-up, Nancy was able to correctly identify 80% of the moderate-probability questions. During the 4-week follow-up, the participant could correctly identify 60% of the moderate-probability questions.

Table 5 displays the percentage of correct responding for the probe questions asked at the start of each session. Target question one was probed on two separate occasions, and prior to two different conditions. Maintenance of gains can be seen as the participant correctly identified the probe 100% of the time each time the question was presented. Target question two was probed during the Video condition and was correctly identified 66.6% of the time. Target question three was probed during the Preferred Conversation condition, and was correctly answered 33.3% of the time.

# I V

## Discussion

This study examined the impact of a novel procedure termed “memory priming” on the ability to recall personally-relevant information for three women with dementia. Contrary to the hypothesis, results of the study indicate that MP in the form of the Preferred Conversation condition was not the most effective intervention for improving the ability to recall personally-relevant information for two of the participants. For the first and second participant, the Reading Aloud condition demonstrated the most improvement. Results indicate that the Video condition was least successful for two out of the three participants. However, flaws related to the design of the study made it difficult to answer the original research questions. These flaws will be further discussed in the limitations of the study.

In addition to observing short-term effects within conditions, some maintenance of treatment gains was seen during the reversals and during follow-up sessions. Unfortunately, for participant one and two treatment gains were not maintained during both 2-and 4-week follow-ups; however, it may be concluded that physical declines noticed in participant two could be responsible. Furthermore, participants one and two were consistently unable to identify probe questions asked at the beginning of each session, indicating a relative lack of maintenance of improvement across treatment sessions. One explanation for this might be that the amount of time that had elapsed from one session to another was greater for these two participants than for participant three. In future studies it will be important to maintain a consistent number of days between each session across participants.

The most effective intervention for two of the participants was the Reading Aloud condition. Claims have been made that the ability to read aloud remains intact as dementia of the

Alzheimer's type progresses and leads to impairment in other areas of cognitive functioning (Cummings, Houlihan, & Hill, 1986). Kawashima and colleagues (2005) found cognitive improvements in persons with dementia using a procedure that included reading aloud. Improvements observed in the current study in the Reading Aloud condition are, therefore, consistent with the findings of Kawashima and colleagues. Kawashima speculated that reading aloud may produce positive effects because it is a process that increases regional cerebral blood flow in certain association cortices, one being the bilateral dorsolateral prefrontal cortex in humans. It is known that this area of the brain plays an important role in executive functioning, an area impaired in individuals with dementia (Kawashima, et al., 2005).

One possible confound present in this study that could be responsible for the improvements observed is the order in which each participant was exposed to each condition. To control for order effects each participant began with a different condition, and was systematically exposed to each intervention. Given that each participant was not exposed to the third condition until an average of 50 days following day one of the first implementation of interventions (range 18-92 days), this may explain why the third condition yielded the least successful results. For participant one, the third condition was the Video condition, for participant two it was the Preferred Conversation condition, and for the third participant it was the Reading Aloud condition. For the first and third participants it was the third condition which produced the least successful recall of the target question, which provides some evidence that the order in which interventions were implemented may have affected the results. Given the limitations and confounds within the design, comparisons made across interventions can only be inferred.

The purpose of the moderate-probability questions was to serve as controls during the course of the intervention. It was expected that accurate responding to these questions would

remain relatively stable throughout the study because they were not targeted in the intervention. Results for the moderate-probability questions varied across participants. The percentage of correct responses to the moderate-probability questions declined during the course of intervention for participant one. Staff did not indicate any medication changes, or physical declines to explain the decrease in performance. Consistent with findings from a previous study (Fiksdal, Houlihan, and Buchanan, manuscript under review), results of participant two's moderate-probability questions remained stable across the intervention. For participant three, the percent correct of the moderate-probability questions increased, indicating possible generalization of treatment effects to moderate-probability questions. Given the inconsistency in results across all three participants it may be necessary to examine a more effective way to determine moderate-probability questions during baseline. One explanation for the decrease in participant one's performance, may have been the length of the intervention and the number of days between sessions. At times, a week would pass from one session to another; thus, increasing the amount of time before feedback was given for any individual moderate-probability question. Sessions for participant three moved more rapidly, and she was receiving feedback for moderate-probability questions 3-4 times per week. Furthermore, during baseline it appeared as though participant three was mixing up the names of her sons and brothers, and daughter and sisters. During intervention the participant had to focus on fewer questions; therefore, leading to improvement in moderate probability questions across the course of interventions.

**Strengths**

The current study has several strengths. First, one goal of this study was to determine if the MP intervention was responsible for improvements in recall. A previous study (Fiksdal, Houlihan, & Buchanan, manuscript under review) that implemented MP did not include

feedback during baseline procedures and also implemented SR as an additional treatment component. This study attempted to address the limitations of the previous study by providing feedback during baseline to ensure that items identified as low-probability items were truly low-probability items. Furthermore, the same feedback procedures were used during the course of all intervention phases; thus, improvement made during intervention cannot solely be attributable to the provision of feedback.

Secondly, previous research examining the effects of MP only implemented one form of priming that involve engaging in preferred conversation prior to asking target questions. The current study compared a Preferred Conversation condition to two additional comparison interventions–watching a video clip and reading aloud. These comparison conditions allowed the researchers to determine if preferred conversation was the active treatment component or if priming could occur with other activities involving varying cognitive effort. For example, the video clip represented a passive activity that required little cognitive effort, while reading aloud was more cognitively engaging than watching a video but required somewhat less effort than carrying on a conversation and was not social in nature. Procedures were held constant across all phases so that any change in the ability to recall the target question can be attributed to the specific intervention. However, it is important to note that one target question item was tied to each intervention. Despite the rational for designing the study in this way, it does present itself with limitations that will be discussed later.

The complex design of the study was also strength. For the current study, three participants each completed all conditions. To control for order effects, each participant began with a different condition and all participants were systematically exposed to each intervention.

To further demonstrate experimental control, reversals within the design allowed the researcher to see if gains made during an earlier session could be replicated and maintained at a later date.

Lastly, sessions were embedded into a social interaction, so they did not appear to be too threatening or strenuous for participants. Anecdotal observations made by the researcher highlighted the enjoyment of the sessions for each participant. At one facility where two participants lived, staff reported that sessions were consistently experienced as positive and indicated that, "Blanche and Maggie enjoy the meetings." The third participant, Nancy, verbalized her enjoyment of the interactions by telling the researcher, "I really like when you come." Staff indicated that Nancy's daily social interaction is minimal, and the daily company was a benefit in itself. On a weekly basis, the researcher informally met with facility staff to assess for any adverse effects such as frustration or agitation following a session. No adverse effects were mentioned to the researcher during or after the course of the study.

**Limitations and Future Research**

Although the current study had several strengths, there are several limitations worth mentioning. Despite the improvements on the design from a previous study, a multiple baseline design or group design may be most effective to demonstrate experimental control. For example, the third target question was not taught to the individual for an extended period of time following baseline, and this data was not probed for prior to the time it was targeted. As mentioned previously, for participant one and three, the ability to correctly recall the target information was the lowest for the third condition of exposure. For participant one this was the Video condition and for participant three this was the Reading Aloud condition. The delay in exposure to these target questions, as opposed to the specific intervention, may explain why correct responding in

these conditions is lowest. Furthermore, a group design with more participants that are randomly assigned to interventions may allow for stronger conclusions to be made comparing the efficacy of interventions.

Similarly, given the variability of correct responding on target questions during baseline for participants two and three, it is unknown as to whether improvements or declines were the result of a specific target or by chance due to the target itself. For example, target question one for Maggie began at 33.3% correct during baseline, which was higher than the other two target items. This target item was also the most successful target item during the course of the intervention. To validate that the intervention was responsible for observed changes, future research should extend this study by taking a target item from the least successful intervention and applying it to the most successful intervention. Thus, an improvement on the target item could be attributed to the most effective intervention; however, if no improvements are observed, one could conclude that it is not the intervention, but that the specific target item is more difficult for the participant to recall.

Lastly, in terms of limitations related to the design, each intervention was paired with a specific target question. Although the rational for designing the study in this way was clear (i.e., using the same target item across interventions would introduce the confound of carryover effects from one condition to the next) , it also yielded limitations. Given the variability in ability to recall target items during baseline, it may be the case that it is not one intervention that is better or worse than the other, but that a specific target item is more easily or difficult to recall. This makes statements related to comparison of conditions difficult to make and offers little answer to questions related to the study's hypotheses.

Another limitation to the study was the small number of participants (N=3). All participants were women, and future studies should involve a more demographically diverse group. Additionally, all participants were women that had different diagnoses. The first participant had a formal diagnosis of AD, the second a general diagnosis of dementia, and the third subcortical dementia. There is much overlap between presentations of cortical and subcortical dementias; however, subcortical dementias display additional motor abnormalities, overall slowing of cognitive processing and mood change (Weiner, Garrett, & Bret, 2009). Furthermore, the most impacted area of memory impairment for individuals with a subcortical dementia is retrieval. Despite impairment in retrieval, these individuals tend to perform better on cued recall (Cullum & Lacritz, 2009). Specifically, for the first two participants, the least successful intervention was the Video condition, the Preferred Conversation condition offered minimal gains, and the Reading Aloud condition produced the most benefits. On the other hand, for participant three (who had a diagnosis of subcortical dementia) the Video condition and the Preferred Conversation condition were the most successful. Future research should include a homogenous sample with regard to diagnosis so that conclusions can be drawn as to the effects of this intervention for persons with dementia of a specific etiology (e.g., Alzheimer's disease).

A final limitation is that the researcher was only able to gather current pictures to use during the treatment session for participant one. For participants two and three current pictures were not available. Blanche's improvement may be explained by the visual cues provided by the pictures in conjunction with researcher feedback. Nancy did not have visual cues for the target or moderate questions, but unbeknownst to the researcher a recent picture for target question two became visible to the participant following baseline. Nancy's dramatic increase in ability to recall this target question may have been the result of the visual cue, but during the second time

this intervention was implemented daily sessions took place in an area where the picture was not visible. While results of the second implementation where not as high as the first, percentage of correct responding still reached 80% on days two and three. Future research should consistently utilize pictures across participants as well as across intervention conditions. As pointed out by Hawley and Cherry (2004) using pictures without the specific target person being physically present reduces the involvement necessary by the target person; thus minimizing time requirements and adding the flexibility of having a trained caregiver implement the procedure into everyday life.

**Summary and Conclusions**

The current study demonstrates that individuals with moderate to severe memory impairment can increase their ability to recall personally-relevant information; however, it is still unknown as to what is responsible for this change. While some gains were made during the course of interventions, for two of the three participants, maintenance of gains was not demonstrated during 2-and 4-week follow-ups. Future research will need to explore ways to best maintain treatment gains and later follow-up sessions. One way to do this may be through the use of booster sessions. Results varied across individuals and across conditions. A technique that is most effective for one individual may not yield similar results to another individual. However, it was found that interventions that required more cognitive effort (i.e., reading aloud and engaging in a preferred conversation) generally produced the most benefits. Although conclusions regarding a best intervention cannot be answered, it can be inferred that an active activity yielded better overall results compared to a passive activity; thus paving the way for future research to compare the two different types of activities. In conclusion, MP may comprise a variety of cognitively engaging activities that may need to be determined on an individual

basis, further promoting individualized treatment plans. Therefore, it is tentatively concluded that engaging in cognitively stimulating activity seems to be a useful technique in increasing recall of personally-relevant information.

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Table 1

*Questions Asked During Phases for Each Participant*

| | Questions | |
|---|---|---|
| | Moderate Probability | Low Probability |
| Participant | | |
| Blanche | Name of oldest daughter | Name of youngest son |
| | Name of youngest daughter | Name of second oldest granddaughter |
| | Former job title | Name of youngest grandson |
| | Husband's name | |
| | Married last name | |
| Maggie | Name of oldest daughter | Name of middle daughter |
| | Name of brother's wife | Name of Sam's 2nd son |
| | Name of Sam's youngest son | Name of youngest daughter |
| | Date of birth | |
| | Name of 2nd oldest daughter | |
| Nancy | Where do you live | Name of Jerry's daughter |
| | Where does Dena lives | Name of 2nd oldest brother |
| | Name of daughter | Where does your daughter live |
| | Where does Jerry live | |
| | Where does Donald live | |

Table 2

*Mean Percent Correct by Target Item and Condition*

| | Condition | | |
|---|---|---|---|
| Participant | Preferred Conversation Condition Target Question | Video Condition Target Question | Reading Aloud Condition Target Question |
| 1 | Baseline: 20%<br>Intervention: 30% | Baseline: 20%<br>Intervention: 0% | Baseline: 20%<br>Intervention: 59% |
| 2 | Baseline: 20%<br>Intervention: 16.6% | Baseline: 25%<br>Intervention: .07% | Baseline: 33.3%<br>Intervention: 43% |
| 3 | Baseline: 17%<br>Intervention: 87% | Baseline: 20%<br>Intervention: 93% | Baseline: 20%<br>Intervention: 20% |

Table 3

*Blanche: Mean Percent Correct by Probe Question and Condition*

| | Condition | | | |
|---|---|---|---|---|
| Participant | Reading Aloud Condition | Preferred Conversation Condition | Video Condition | Reading Aloud Reversal |
| 1 | Probe (TQ1): 33.3% | Probe(TQ2): 33.3% | Probe (TQ1): 0% | Probe (TQ3): 0% |

*Note.* TQ1 = target question 1, TQ2 = target question 2, and TQ3 = target question 3.

Table 4

*Maggie: Mean Percent Correct by Probe Question and Condition*

| | Condition | | | |
|---|---|---|---|---|
| Participant | Video Condition | Reading Aloud Condition | Preferred Conversation Condition | Video Reversal |
| 2 | Probe (TQ1): 0% | Probe(TQ2): 0% | Probe (TQ1): 25% | Probe (TQ3): 33.3% |

*Note.* TQ1 = target question 1, TQ2 = target question 2, and TQ3 = target question 3.

Table 5

*Nancy: Mean Percent Correct by Probe Question and Condition*

| | Condition | | | |
|---|---|---|---|---|
| Participant | Preferred Conversation Condition | Video Condition | Reading Aloud Condition | Preferred Conversation Reversal |
| 3 | Probe (TQ1): 100% | Probe(TQ2): 66.6% | Probe (TQ1): 100% | Probe (TQ3): 33.3% |

*Note.* TQ1 = target question 1, TQ2 = target question 2, and TQ3 = target question 3.

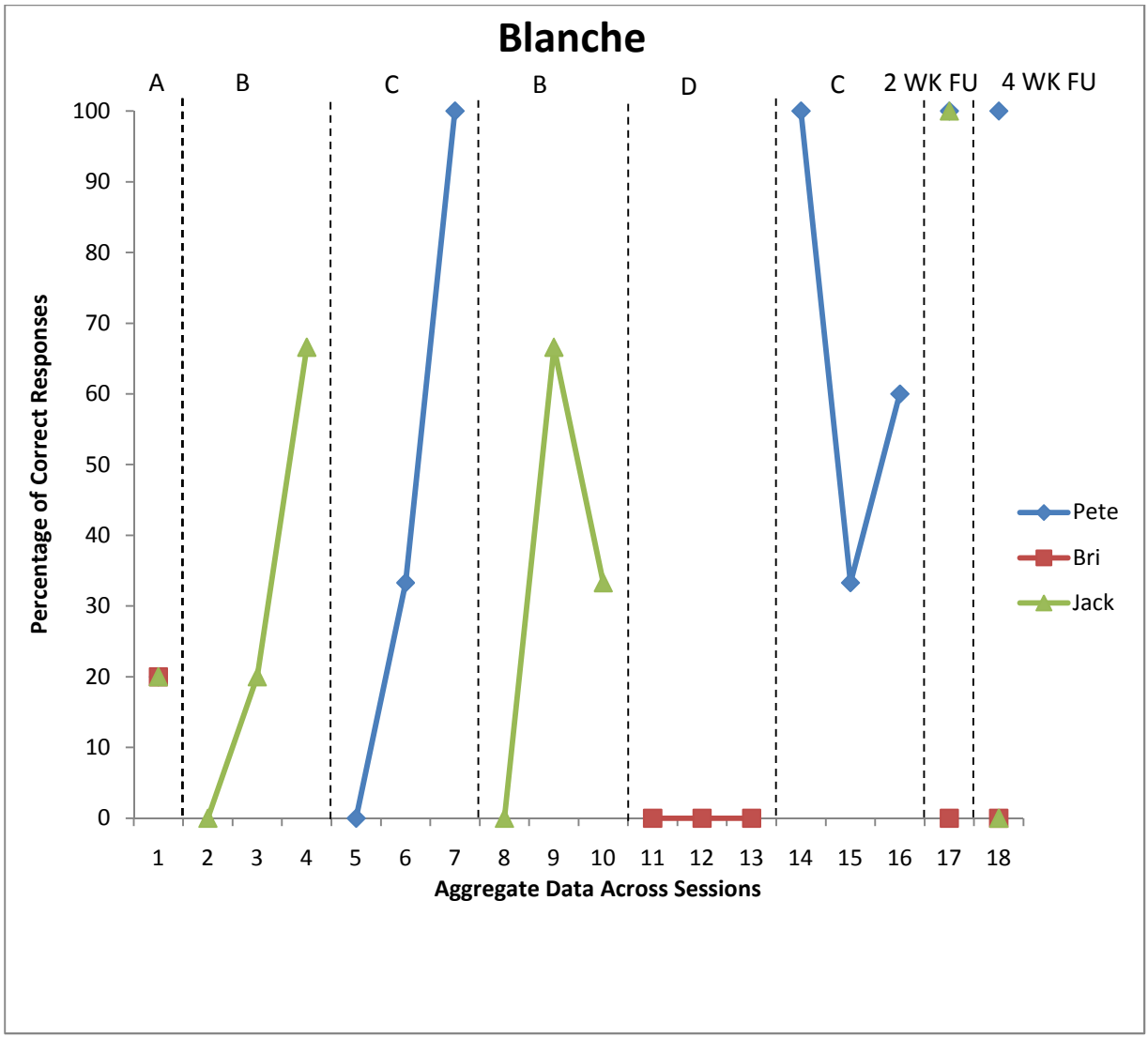


*Figure 1.* Aggregated Data: Blanche. A=Baseline B=Preferred Conversation, C=Reading Aloud, D=Video.

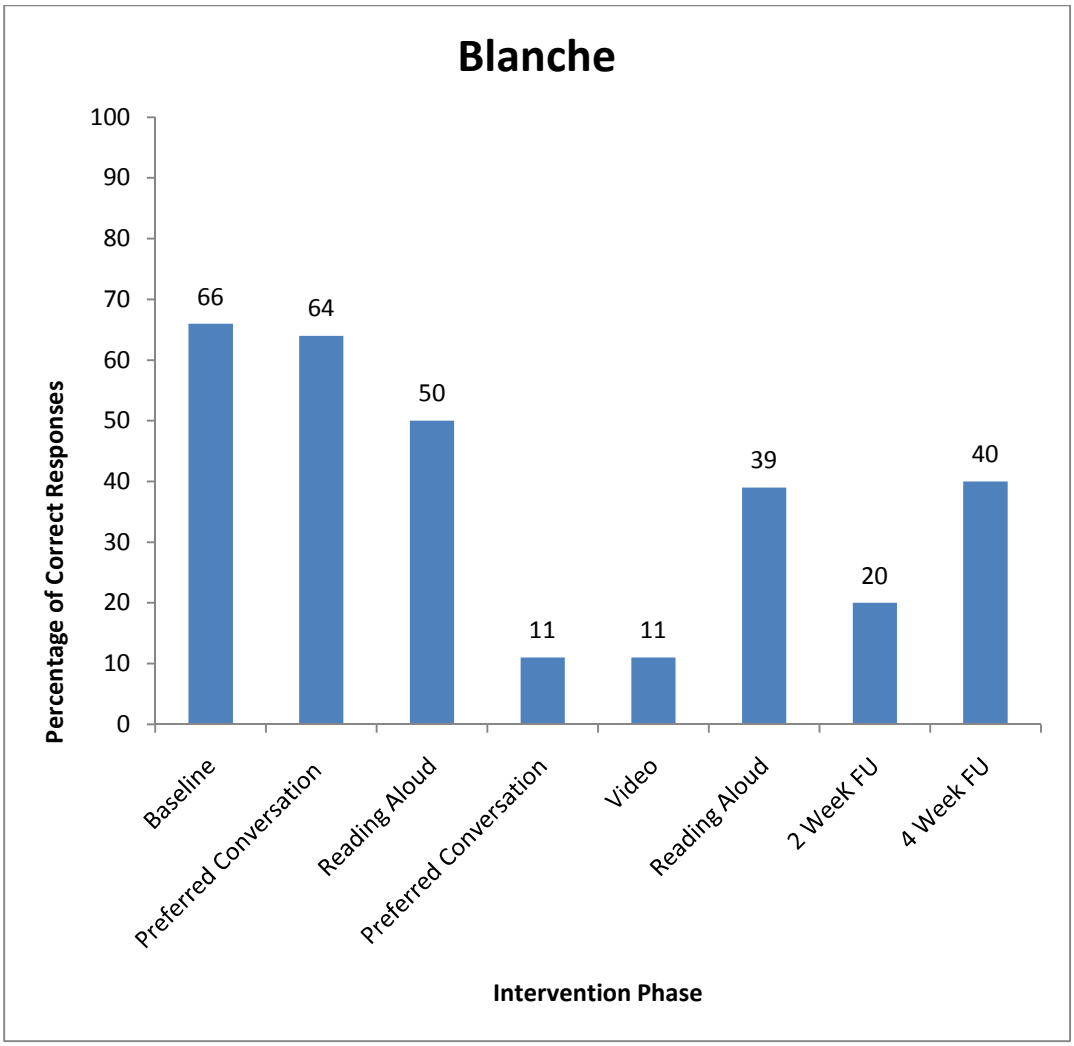


*Figure 2.* Aggregate Data of Moderate Probability Questions Across Intervention Phases.

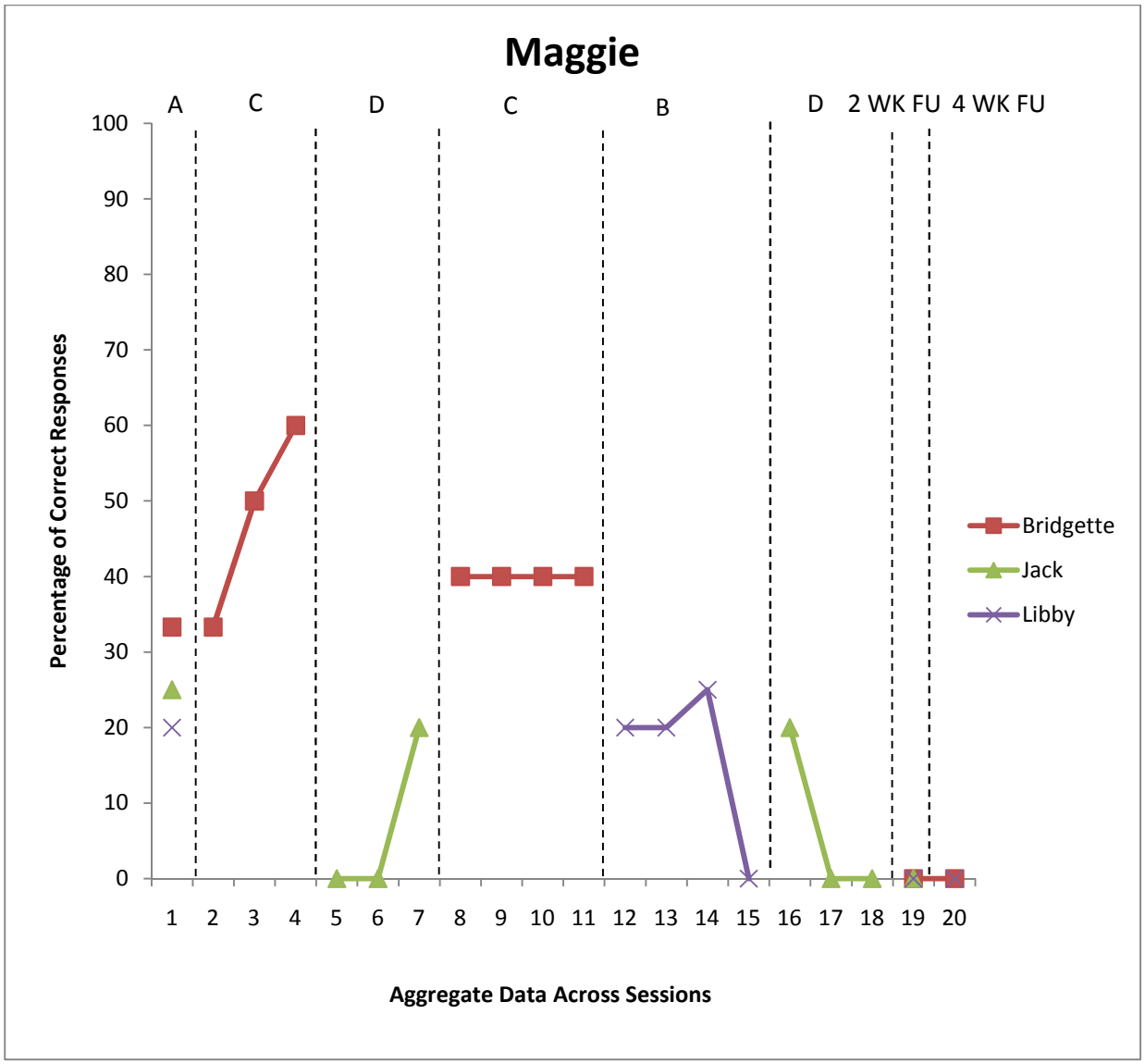


*Figure 3.* Aggregated Data: Blanche. A=Baseline B=Preferred Conversation, C=Reading Aloud, D=Video.

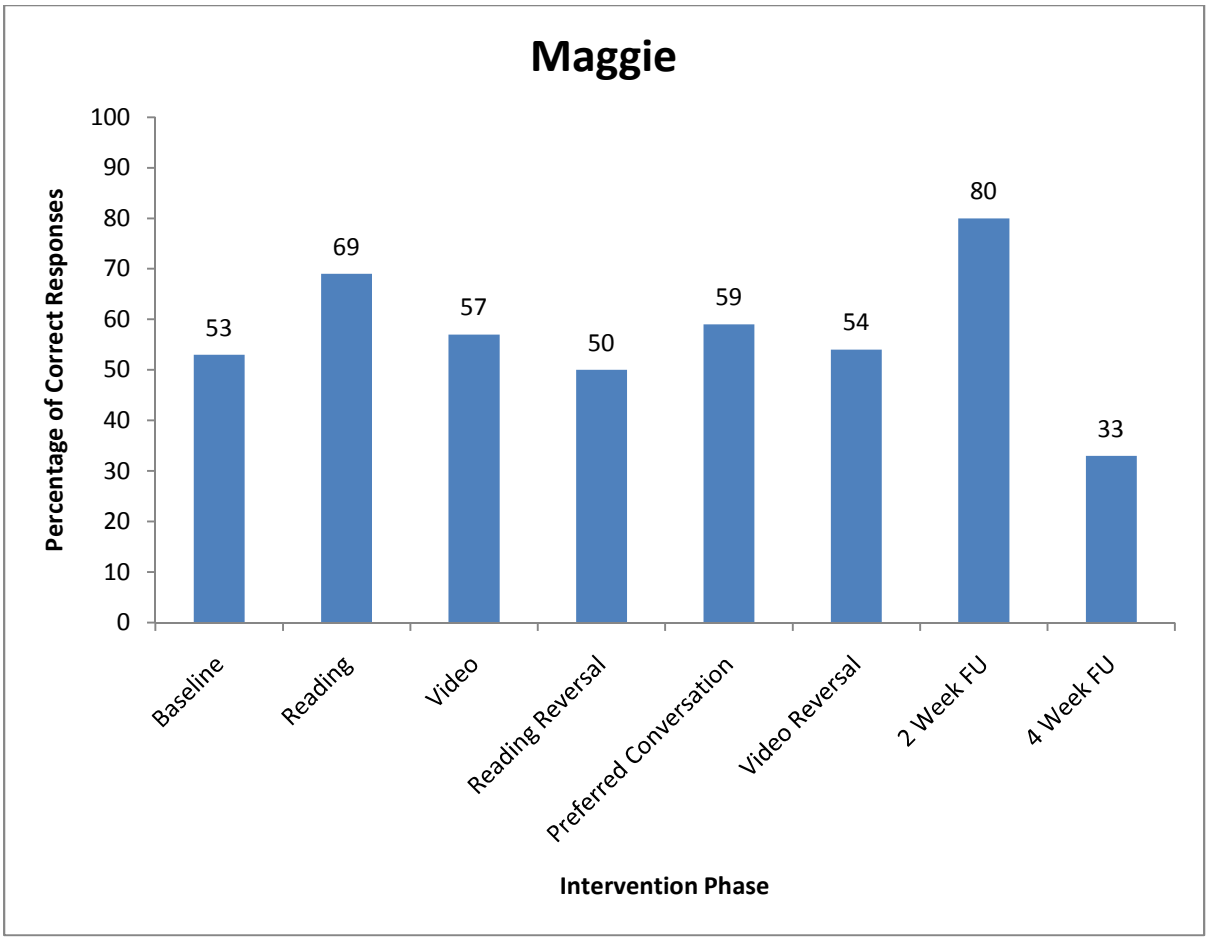


*Figure 4.* Aggregate Data of Moderate Probability Questions Across Intervention Phases.

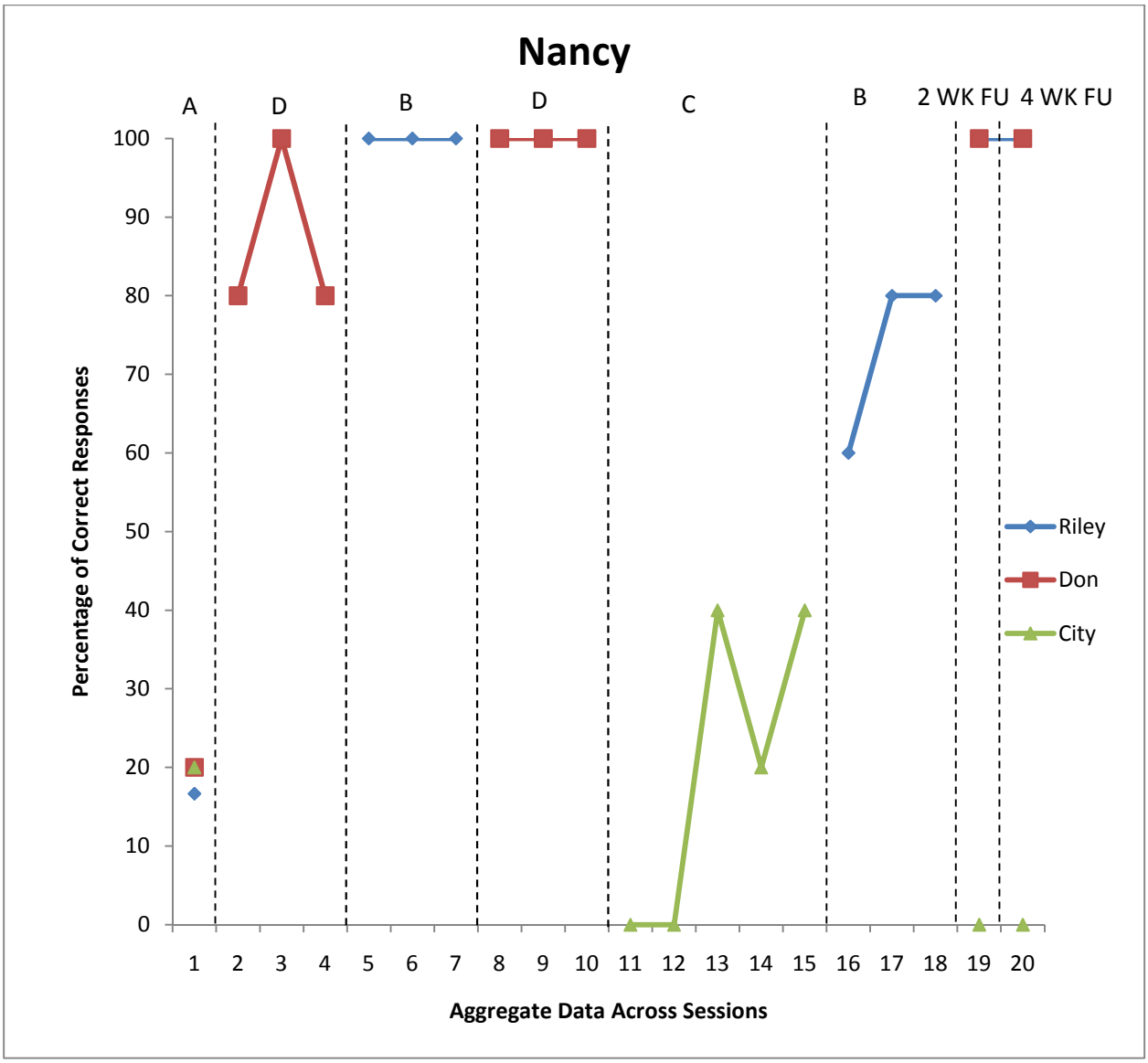


*Figure 5.* Aggregated Data: Blanche. A=Baseline B=Preferred Conversation, C=Reading Aloud, D =Video.

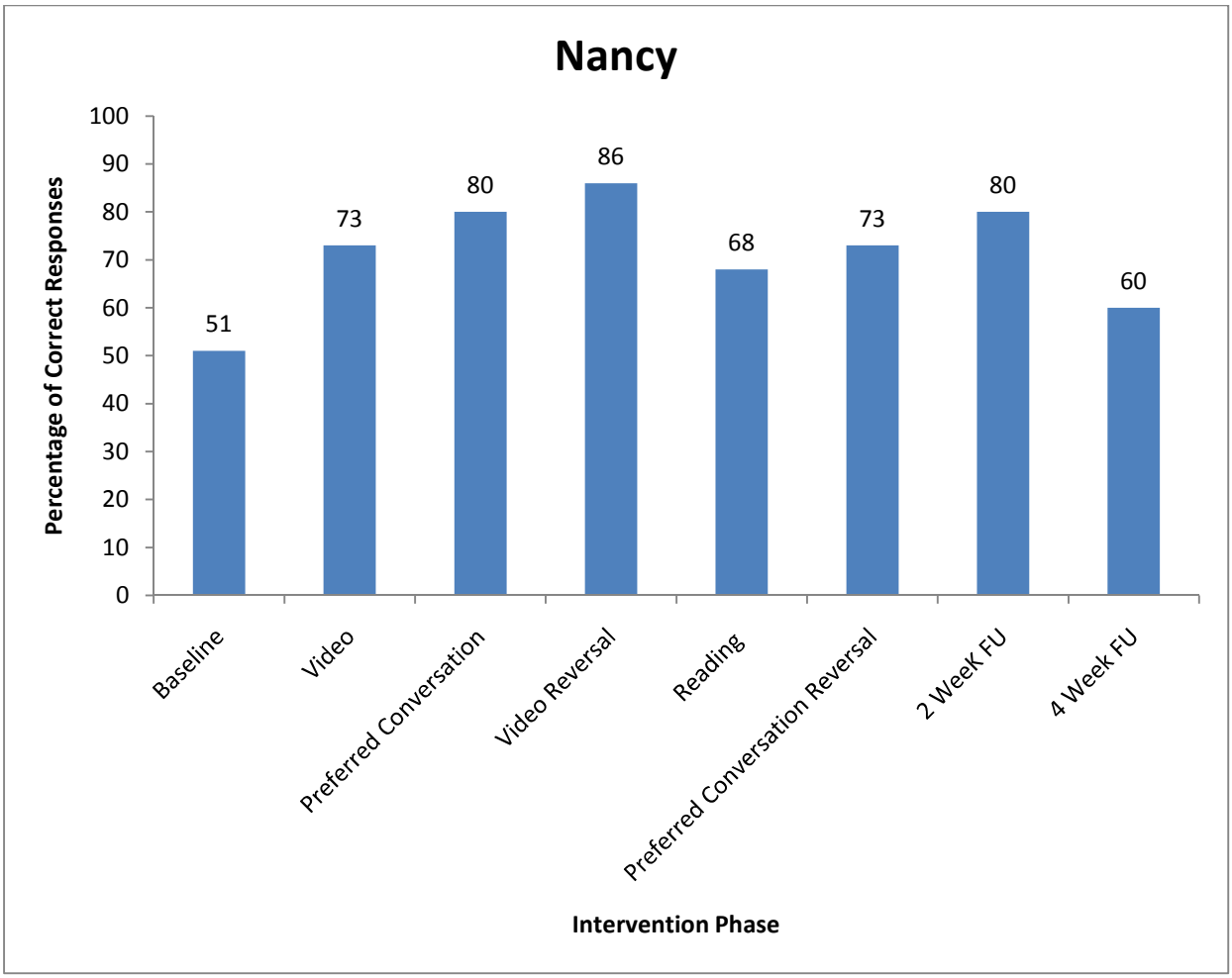


*Figure 6.* Aggregate Data of Moderate Probability Questions Across Intervention Phases.

# Appendix A

## Letter for Family Members

Dear family member,

My name is Jeffrey Buchanan, Ph.D. and I am a Professor of Psychology at Minnesota State University. Jessica Deselms, a graduate student who works with me, and I are conducting a research study and staff indicated to us that the person for whom you are guardian may be appropriate for participation in this study.

The purpose of the study is to compare the effectiveness of a learning procedure called "cognitive priming," compared to two control conditions. The control conditions will consist of reading a neutral newspaper article and watching a clip of a neutral weather clip. Each session will last approximately 20 minutes, in which we will be engaging in a preferred conversation topic in a preferred setting. We will be conducting one session per day to avoid fatigue however, if your loved one either becomes tired or agitated, we will end our session immediately.

If you would like to have the person for whom you are guardian participate, please sign the enclosed consent form. Please send consent forms to the address below or drop them off with facility staff if you decide to participate. We will send you copies of the signed forms for your records. Also, we expect to start the study in May 2011 and end in May 2012. We can send you a copy of results if you would like.

Please call me, Jeffrey Buchanan, at 507-389-5824 if you have questions. We appreciate your time and willingness to consider having your loved one participate in our study.

Sincerely,

Jeffrey Buchanan, Ph.D.

Minnesota State University, Mankato

Department of Psychology, AH 23

Mankato, MN 56001